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ABSTRACT

This study examined W. Doyle's notion of academic task as content representation in the college setting, examining the products students were asked to produce, the operations they were required to use in order to produce those products, the cognitive operations required and resources available, and the accountability system involved. Interviews were conducted with seven undergraduate-to-doctoral level teachers who were teaching a particular course for the first time. Detailed findings are presented from one case as an example of the teacher's view of the purpose of the course, the design of student tasks, and the thinking that accompanied the process. Across the seven participants, three themes emerged: (1) task systems were designed to engage students with course content in a thoughtful way throughout the semester and to allow them to synthesize that course content at the end of the semester; (2) learning through doing emerged as an implied instructional theory; and (3) task design served as a mirror of the way students are expected to think in the discipline. These three themes yielded two major conclusions: (1) academic tasks provide the vehicle for knowledge transformation, so that the course content can be comprehensible to students, and (2) through academic tasks students perform the activities necessary for assimilating and comprehending course material. (17 references) (JDD)

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Academic Tasks as the Representation of Content in Postsecondary Teaching

Presented at the 1990 Annual Meetings of the Association for the Study of Higher Education

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ASSOCIATION FOR THE STUDY OF HIGHER EDUCATION

This paper was presented at the annual meeting of the Association for the Study of Higher Education held at the Red Lion-Jantzen Beach in Portland, Oregon, November 1-4, 1990. This paper was reviewed by ASHE and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC collection of ASHE conference papers.

Academic Tasks as the Representation of Content in Postsecondary Teaching

As the body of research on postsecondary teaching has grown during the past decade, it has also shifted in focus from effectiveness studies to studies of teacher and student cognition, as well as shifting from the study of generic teaching skills to study of the cognitive aspects of teaching as imbedded in the content being taught.

Among the cognitive aspects of teaching most recently studied has been college teachers' thinking about and planning for their course design and instruction. The work of Stark and Lowther (1986), Stark and others (1988), and Lowther and Stark (1990) on postsecondary curricula and course planning provided the foundation for the present study. This work has shown that the tasks teachers plan for their students are among the most important aspects of teachers' overall course planning. Doyle (1986b) has pointed out for elementary schools that the academic task is the mechanism through which the curriculum is enacted for students. Research on university teaching has also demonstrated the importance of the academic tasks teachers design. In many cases the tasks assigned to students -- together with formal instruction and texts -- become the manner in which the content of the discipline is represented to students.

When defining the academic task, Doyle (1986a, 1986b) discussed four important aspects of the work students do for their classes: "a goal state or end product to be achieved, a problem space or a set of conditions and resources available to accomplish the task, the cognitive operations involved in assembling and using resources to reach the goal state, and the importance of the work to be done" (p. 366). Types of academic tasks, according to Doyle (1986b) are distinguished by the cognitive processes required to complete them. For example, when students are required to choose and apply knowledge, models and procedures to solve problems, draw conclusions from evidence, or formulate and carry out a complex writing assignment, the process demands interpreting and transforming knowledge rather than merely recalling it. The academic task, then, shapes and organizes student thinking (Carter & Doyle, 1982).

Although we acknowledge that other notions of content representation have been discussed (eg by Donald, 1986. 1987) in the higher education literature, based on suggestions made by McKeachie and colleagues (1988) this study investigated Doyle's notion of academic task as content representation in the college setting, examining the products students were asked to produce, the operations they were required to use in order to produce those products, the cognitive operations required and resources available, and the accountability system involved. We were mindful of one significant difference between K-12 and postsecondary settings in our adaptation of Doyle's conceptions: while much of the learning in elementary and secondary schools takes place in classrooms, most of college students' learning occurs outside the classroom. College teachers, then, design tasks to shape learning over which they have limited direct supervision.[1]

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[1]A caveat should be acknowledged for this study. It is important to distinguish among (1) the task as conceived in the teacher's mind, (2) the one announced to students, (3) the one negotiated by students as their work progresses, and (4) the task as perceived in the minds of the students (Doyle, 1986b). This study examined only the tasks teachers described in syllabi and interviews.

The Larger Investigation

The study was part of a larger effort investigating university teachers' course planning, conducted at an AAU public research university. In contrast with the Stark et al. (1988) work involving large samples and aggregated data, the present study expanded and explicated their findings by exploring in greater depth the influences on teachers' planning, the actual process of their conceptions about and use of academic tasks in their teaching, teachers' views on the purpose of education, expectations for their students, and thinking that accompanied their course design process. Campus wide contacts provided nominations of experienced professors with good teaching reputations who were teaching for the first time a regularly offered or newly created course.

Seven teachers, representing six disciplines and teaching courses ranging from freshman to doctoral level, agreed to participate: (1) Andrea, an experienced professor in a College of Nursing, who was teaching the revised graduate level education process course, the first semester of a two-semester block; (2) Diana, a seasoned member of the humanities faculty, who was teaching the first semester of a revised three-semester sophomore level humanities block, a course planned by committee; (3) Kathryn and (4) Linda, who collaborated in planning and teaching a women's history doctoral seminar on race and gender; (5) Matthew, a veteran in the School of Engineering and principal lecturer for a team-taught introductory engineering course planned by committee; (6) Mike, a young teacher, who planned and taught a doctoral level course in business management; and (7) Valerie, a young teacher, who planned and taught a newly created lab course to accompany a sophomore-level nonmajor course in wildlife biology.

Participants were interviewed four times: before, after, and twice during the semester of the "new" course in question. This schedule, resting on the concept of change as a guideline, was planned to unearth important data at times when the original planning was intact and when information about modifications would be most naturally apparent.

The first interview occurred before the first class so that the initial course planning was still clear in the professors' minds and had not changed as a result of the actual class sessions. The second interview occurred about four to five weeks into the semester to discuss how the initial planning had worked out, how it had been altered, and why. The third interview took place about six to seven weeks later in order to investigate further planning and changes, as well as to determine how the earlier changes had worked. The fourth and final interview was conducted at the end of the semester to discuss the teachers' thoughts about how they would teach the class again.

Each interview consisted of three to five open-ended questions, as well as some sorting tasks used to generate additional dialogue about certain topics raised during the interviews. Some questions were developed directly from Stark's, Doyle's, and others' conceptions about academic tasks; in the three later interviews other questions were guided by initial analyses of earlier interviews, as suggested by Spradley (1979). Additional questions regarding our areas of particular interest -- such as task structure -- were added through the semester, including, for example, (1) the rationale for the tasks, (2) the kinds of thinking expected of the students, and (3) teachers' beliefs about the purposes of education. The interview transcripts were analyzed using an overall strategy outlined by Strauss (1987) that rested heavily upon the domain analysis techniques explicated by Spradley (1979) incorporating several of the triangulation methods outlined in Yinger's (1987) discussion of research on teacher thinking, including inter-coder agreement.

Method for Studying the Academic Task

The question designed to elicit details about academic tasks was:

> "As I've said, one of the things we're doing in these interviews is trying out on you some notions about teaching that various writers have discussed in the research literature. One idea concerns the tasks -- the assignments, projects, activities, whatever that teachers have students do. What we want to explore is the function these tasks perform. Would you pick two of the tasks from this class and explain to me exactly what each does in this course? How does this task reflect the course content? How does it manifest the way students are expected to think?"

To supplement this direct question about tasks, a question devised to discover teachers' beliefs about the purposes of education was modeled after the work of Stark and others (1988) and utilized the notion of alternative conceptions of curriculum (Eisner and Vallance, 1973; Eisner, 1985). Eisner's five orientations toward curriculum were paraphrased and presented to participants on index cards, with the following:

> "Scholars who have studied the purposes of education and the goals of particular courses of study have noted that teachers conceive of these purposes and goals in varying ways. I would like you to look at one set of ideas and tell me how they agree with your thinking regarding this course. Please assign a number from zero to 100 to each card keeping in mind that the total must equal 100. Please tell me why you allocated the way in which you did, and how these ideas pertain to the course we have been discussing."

Our data for the larger investigation derived from five sources: (1) four taped and transcribed interviews per participant, (2) additional information from sorting cards used with some questions, (3) the material contained in course syllabi for the six courses the participants were teaching, (4) researchers' notes written about their impressions during interviews, and (5) curricula vitae of participants.

Because the data on academic tasks drew principally from the interviews, they pertain only to the tasks as discussed by the teachers as a function of planning activities. It is impossible to know how the tasks were actually carried out by students, what negotiating took place, and what level of thinking actually occurred, since students were not observed or interviewed. We worked to reduce the likelihood that the interviews might be distorted as a result of the process, either by the use of leading questions on the part of the researchers, or by the possibility of participants' masking reality in the telling (Grumet, 1987).

Findings

Because for this ASHE presentation it is impossible to explicate our results for all seven participants in a meaningful way, we have chosen one case as an example. Following is an overview describing the teacher and the course he taught, as well as his view of the purpose of this course, the tasks he designed for his students and the thinking that accompanied the process.

Mike

Mike is a young teacher whose first postdoctoral work experience was in public policy analysis at the state level. During the semester in which he participated in our study, he taught a graduate course in Business Management for the first time. This particular course is required for those concentrating on the administration track of a doctoral program in his field, but optional for those with other emphases. This graduate program is directed toward preparing theorists, academics, and researchers, although many aspects of the program, and this course in particular, are tailored to those primarily interested in becoming practitioners.

Keeping within the boundary of these program goals, Mike was able to design the course himself. He reported that he drew upon his own experience as a student and checked the syllabi from the department files as starting points for his planning, and then modified and updated the content of the course.

Purposes of Education

The sorting task on educational purposes presented statements summarizing five curricular perspectives. The five, together with all seven teachers' weightings through allocations of their available 100 points, appear in Table 1. Mike's allocations were:

30	Developing their cognitive processes, helping students learn how to learn and providing opportunities to use and strengthen intellectual faculties
0	Fostering intellectual growth by inquiring about such concepts as life, truth, justice, and knowledge by studying the great works as well as the basic fields in the arts and sciences
70	Providing students with opportunities and resources so that growth can occur in students through their own choices in the areas relevant to them
0	Providing the means for society to remedy social problems, answer manpower needs or fulfill the needs of students as they take their place in society
0	Raising the consciousness of students regarding social ills so that they can become motivated to alleviate them

Mike's initial reaction to these five was that because his course was practical, these curricular conceptions were not directly related to the course we were discussing:

> "Very philosophical. They're not practical enough to relate to the development of a graduate course on business management."

However, we found that his weighting of the five did provide a background for understanding his use of academic tasks. Regarding "developing cognitive processes," he first pointed out that his students' average age was probably [in the] early forties, and that they had already developed their cognitive processes.

TABLE 1

Purposes of Education	Andrea	Diana	Kathryn	Linda	Matthew	Mike	Valerie	TOTAL POINTS
Developing their cognitive processes, helping students learn how to learn and providing opportunities to use and strengthen intellectual faculties	50	15	20	35	40	30	30	220
Fostering intellectual growth by inquiring about such concepts as life, truth, justice, and knowledge by studying the great works as well as the basic fields in the arts and sciences	0	30	10	10	5	0	0	55
Providing students with opportunities and resources so that growth can occur in students through their own choices in the areas relevant to them	50	30	25	35	30	70	30	270
Providing the means for society to remedy social problems, answer manpower needs or fulfill the needs of students as they take their place in society	0	10	25	10	20	0	30	95
Raising the consciousness of students regarding social ills so that they can become motivated to alleviate them	0	15	20	10	5	0	10	60

> "I'm more concerned about influencing perceptions and to some extent, increasing knowledge per se, than I would developing cognitive processes in most of my students."

As he went on, however, he began to redefine this conception:

> In graduate course work for people 90 percent of which are older than me, the notion of developing cognitive as opposed to affective processes is hardly applicable. But, I consider the acquisition of knowledge a cognitive [skill]. So I'm expanding there, and I'm hoping to increase their analytical abilities within a field of higher education policy and management. So that's a cognitive pro[cess] -- that's the only reason why I'm saying this applies.... At this advanced stage of graduate work, people are very knowledgeable. Most of them are just getting their union card, to be honest with you. So they're polishing themselves off, or maybe expanding their knowledge. That's why this has value -- that's a cognitive process.

One other curricular purpose was deemed applicable to the course; this purpose earning 70 points:

> Providing students with opportunities and resources so that growth can occur in the students through their own choices in the areas relevant to them -- that I can see in this course. You know, I want students to learn enough about the concepts, the techniques, and their use.... They can select whatever they want after that.

He went on to say why this purpose fit his own purposes for the course so well:

> It's a course to designed to -- it's for personal fulfillment and enrichment.... It's sort of like, how can I become more marketable so that I can get a better job. That's the focus of the course.... It's the most practical, career-oriented course in the whole program, and it's a graduate course, graduate school. This is where I learn to build up a career.... internships, getting them connected, giving them dissertation topics, things they think are important to their careers.

In summary, two of Eisner's conceptions of curriculum pertained to Mike's conceptions of this graduate business management course. How these curricular purposes were manifest in the tasks Mike established is discussed below.

Academic Tasks

The course addressed twelve topics during the semester, through a format in which students worked in pairs or trios, each student task force investigating one topic in depth. Students presented their material to the class, and the class members participated in and critiqued the class sessions. Mike's purpose for this format, he said, was to encourage students to work together, to become experts on one of these topics, and to deal with the topic in a realistic manner. When the presentation and critique were completed, Mike used the remainder of the class time to reaffirm and/or supplement what was said in class, to pull together the content of the readings and the presentations, and to correct any misconceptions, if necessary.

The students were each required to complete several tasks:

> (1) research a topic in depth as part of a two or three person task force;
>
> (2) introduce and explain the topic, usually a management tool, to classmates in a forty-five to seventy-five minute presentation, including definitions, historical perspectives, business origins, purposes, uses in educational settings, applications, recommendations, and relationship to management writ large;
>
> (3) write a team paper about the topic, based on the research, their presentation, and the critique;
>
> (4) read a packet of materials for other teams' course topics;
>
> (5) participate in critiques of other presentations; and
>
> (6) write a final exam.

In Doyle's terms, then, the task products were

- team design of an effective class session
- team production of a term paper
- individual critique/participation in class
- final exam study and performance

The cognitive operations expected of students -- Doyle's second aspect of academic tasks -- were described by Mike in several ways. For example, for team design of an effective class session and production of a term paper, Mike expected each student to become an expert on the topic or management tool addressed by his/her team. Students were to understand "what it is, the way it is used, and the politics involved in its use; to analyze the literature critically; and to understand the implications, feasibility, and value of the technique." Discussing ways he communicates the kinds of thinking he expects of students, Mike responded:

> ".... it's too complex to articulate. It's a million little things that you do. It's the amount of literature, how you ask people to present things. How content you are with the questions that the critique team is asking. "What kind of question is that?" "Well, why didn't you ask this?" Or how you supplement the critique team....

He continued with an extended example, then said

> So you can see -- those are not the things that you read in books. You won't see that in any literature, but those are the kinds of questions I want my critique team to be able to deal with.... I want them to be very critical, to think about every topic in every conceivable way possible and to do it in a very relaxed manner. And once you've set that, you establish a mind set. You'd be surprised how students then read the next literature with a much more critical eye and thinking about different things. They approach it with a much

> broader mind set. And so that's the kind of thinking, I think, that helps facilitate the grasping of a topic.

Doyle's third aspect of the academic task is the "problem space or set of conditions and resources available to accomplish the task" (1986b, p. 366). The problem space Mike established rested heavily upon task forces responsible for 12 class sessions on the management tools studied; the set of conditions he crafted for the course included the student's functioning within the task forces, interacting constructively with other task forces (in each class discussion/critique), and learning independently from other student task forces (in order to demonstrate course mastery in the final examination). Resources available to help students complete these assignments included: (1) topic-related literature, both from the packet of readings and in the library, (2) experts on campus and in the community, (3) their teacher, and (4) their fellow students, some of whom would be considered highly knowledgeable on certain topics based upon their work experiences, and many of whom would have participated in the critiques.

Mike discussed with us his expectations for the assignments -- his accountability system conveying the importance of each task. He described the paper as a written, scholarly discussion building on the presentation, incorporating all the feedback given in the critique and his follow-up comments, and including the topic's relationship to theories of management and its uses in public institutional settings. He explained the purpose of the paper by saying that it "serves as a process of crystallizing their know-how, their knowledge and understanding of a topic."

He characterized the final exam as

> a means to an end.... The preparation for the final is what serves to achieve that end.... It requires a special synthesis and preparation.... What's important ... to know is rationale, the requirements from organizational management, leadership resources to implement these successfully, the steps of implementation for each of these techniques and how they compare. Why would you select MBO over PPBS if you only get one choice? Or why would it be more important to do an assessment plan ... as opposed to doing a strategic plan or a master plan, if your resources have to go exclusively into one or the other?

He told students what would be on the exam so that his goal of synthesis would be achieved. He stated emphatically

> "the final exam would not have achieved its goals if I had not provided that context. I think not to have informed the class about what the final exam was designed to do or what it was going to look like would have been misguided and I wouldn't have achieved ... the goal."

He expressed the belief that the test provided a valid measure of student learning and that it granted a means by which to assess students "fairly and legitimately for their course grade."

Mike spoke of the critique as a method of ensuring that a topic was thoroughly and critically examined, as an opportunity for students to ask for clarification, and as a means of determining what he would need to cover in his comments near the end of the class. "I want the students to be very assertive and aggressive, to get involved, to be very involved, because if they don't

understand [something about the topic], it gives me the last half hour, 40 minutes of the class, to lecture meaningfully." Although it was not directly stated, the critique provided a learning situation in which students were compelled to keep up with the weekly readings.

Mike's grading system involved all four tasks:

30 percent oral presentation,
30 percent written paper,
30 percent final exam,
10 percent quality of critiques.

Mike mentioned that he told students all grades were on the border, meaning that the critique was extremely important.

Interpretations: Mike

Overall we found, as shown above, all four categories of Doyle's academic task conceptions in Mike's thinking. Two major themes emerged from our analysis of Mike's planning for the academic tasks used in this business management course: the complexity of the interlocking task system Mike constructed, and the importance of simulating professional practice in the course tasks themselves.

Complex Task System

Mike delineated a complex task system with multiple components, designed to require high level critical thinking. The task system was complex in that each element drew from Mike's sense of curricular purposes, and in that all elements interrelated. The task system was designed to present situations and problems realistic to business management. Mike's expectations for students specified the processes they were to follow in the course as well as the content they were expected to learn. One of Mike's intentions for a course format, he explained, was the benefit to students of their collaboration:

> I think the whole notion of tolerance -- I think it's building tolerance. I assume in some cases that it was tough for some folks.... They are intolerant of different approaches and views. I think [one of] the benefits is tolerance. They have to learn introspection. It makes them think about how they do things and how they relate to people.

Another benefit was more specific to the presentation itself:

> And I can see the students are doing organization. Students are learning a lot about how to organize their thoughts, how to critique. Surprising -- even though many of them have -- most of them, not all of them, have very good professional backgrounds -- their opportunities to make presentations of this sort seem very limited.... And it's reflected in their inability to keep the presentations within the time frame. However, I had allowed for that, known that this would happen.

> So there are countless benefits that are coming out of this. Mostly from the student development perspective [one of the purposes].... I feel that all-in-all, it's providing the kind of over-all well-rounded education that I want in the course. The other thing is, it's allowing them to really integrate -- to learn the material, not memorize it, to understand it. You cannot present something, synthesize it, discuss it, critique it, and respond to questions, and only have memorized. There's something about an oral class presentation of that magnitude that requires that you understand the material.

In describing his task system Mike acknowledged two important factors discussed by Doyle and Carter (1984) as they elaborated on the accountability aspect of task design. They noted that the evaluation of academic work creates conditions of ambiguity ("extent to which a precise and predictable formula for generating a product can be defined," p. 131) and risk ("stringency of the evaluation criteria and the likelihood that these criteria can be met on a given occasion," p. 131). They also noted that students give serious attention to work when they are held accountable for it. Important academic work, consisting of high level cognitive tasks, inevitably involves both high ambiguity and high risk, because (as is especially the case in college work) both the task product and the task process are somewhat uncertain. Mike was not unaware of these factors. He mentioned the risky aspect of accountability for students working jointly, particularly in our society where competition is such a strong value.

> "They were being held accountable for that presentation, so they looked at the other person's performance as having a major impact on their grade."

Mike also addressed his tasks' ambiguities. He wanted to make certain that students really understood the material, he said. He felt strongly about avoiding ambiguity and confusion, both about the course content and about the prescribed course procedures. Remembering his experiences as a student trying to learn a statistical procedure, he said,

> When I actually went out and did [the procedure], then I found out how to do it. I actually had to re-learn it to do it, and learn it in the process of doing it.... My experience as a student, I have very fresh in my mind, and I want to make sure that my students don't ever experience it.... I'm applying that philosophy to this course. I would rather they learn five or six major management concepts and strategies than walk away knowing very little about 12 or 15....

Doyle and Carter point out that when academic tasks are highly risky and highly ambiguous, students often work to negotiate reductions in either the risk or the ambiguity, or both. The way in which Mike talked about ensuring students' clarity about the final exam's content, and the importance of clarity in Mike's explanations, alerted us to the possibility that Mike might have (consciously or inadvertently) reduced the complexity of the cognitive processes required by these tasks. Certainly Mike's handling of the exam and the course expectations reduced some ambiguity, while the collaborative format had the potential for increasing or reducing the risk, depending upon how well the students worked together.

Professional Simulation

The tasks Mike designed required students to engage in work that would be similar to the work of people employed in this field, with perhaps two exceptions: (1) the course work delved into

history and theory for each management technique, and (2) the course format could not accommodate in one short semester the context-imbeddedness of every management technique employed in professional practice. As a consequence, the subject matter of business management was presented in this course rather more conceptually, for example as problem-solving based on institutional goals and achieved through application of specific techniques.

Simulation of the realities of professional practice took place in this course through a range of tasks. The most specific course experiences and tasks exposed students to specific personal skills necessary for professional functioning:

> And it's also a very good professional development opportunity. Every opportunity you can provide an individual that's developing themselves to speak, to take the lead position in something.

At a somewhat broader level, professional practice was also simulated in the course topics -- and Mike's intentions for students' understanding of those topics:

> As long as they can walk out and say, "You know, I understand budgeting. I really understand zero-based budgeting. Why an institution would give a damn about even implementing ZBB, or what ZBB is." Really understand what a decision package is, and the politics behind it, and prioritizing -- why you need to prioritize or what are the dynamics behind that process. What are the outcomes of ZBB and how feasible it is to develop a budget like that as opposed to formula budgeting. Or "I understand why a formula budget is important to drive the state funding mechanism. I understand that."

Viewing this particular course in the context of the larger graduate program, Mike also emphasized the importance and role of professional practice:

> I see the need for a program of this sort to marry the three: practice, history/philosophy, and research. And so that's my view of it. Other departments may not need to do that .... But I cannot see a program [in this field] with a focus on administration not having the kind of orientation toward practical management that my course aims at providing student.

In sum, these interpretations of Mike's teaching through academic tasks illustrate the interrelatedness of this teacher's curricular purposes, pedagogical intentions, and task design. Overall purposes for cognitive development and student growth yielded a course of concentrated subject matter and intense student involvement. In emphasizing "learning through doing" Mike not only arranged students' exposure to a dozen or more core topics of the field, but also simulated professional work by exposing students to the activities professional work requires -- collaboration, presentations, synthesizing, and problem solving using complex thought processes. The tasks served multiple purposes, such as providing students with opportunities to work together, to learn management techniques, and to evaluate that content in the context of future job interests. Altogether these complex academic tasks -- risky and often ambiguous -- carried through Mike's curricular purposes.

Conclusions

Mike was but one of our seven subjects in this research. In our findings across the seven participants, three themes emerged, all of which have been illustrated above for Mike: :

(1) Task systems were designed to (a) engage students with course content thoughtfully throughout the semester and to (b) allow them to synthesize that course content at the end of the semester,

(2) Learning through doing -- and explicitly through doing the specific academic tasks -- emerged as an implied instructional theory

(3) Task design served as a mirror of the way students are expected to think and/or work in the discipline, and

These three themes, taken together with the two pedagogical intentions our teachers emphasized (Table 1), yielded two major conclusions about the role of academic tasks in college courses:

One Academic tasks provide the vehicle for knowledge transformation, so that the course content can be comprehensible to students

This conclusion parallels Doyle's conceptions of the academic task as a representation of course content. It is not a surprising conclusion; what this research adds to Doyle's already well explicated work is evidence on how his ideas apply in the college setting.

Two Through academic tasks students perform the activities necessary for assimilating and comprehending the course material.

This conclusion complements content representation as the primary function of academic tasks with a second function: tasks enable the student to engage in the activities necessary for knowledge transformtion to occur.

The following two sections of this paper discuss how our three major themes contribute to these two conclusions.

Content Representation via Academic Tasks

Engagement and Synthesis

All seven teachers built into their task systems academic work that motivated the students (1) to keep up with the reading as assigned throughout the semester and (2) to pull together the course content as the semester progressed. For example, Mike used the critique as means of ensuring that students completed the readings every week and then applied the content of the reading by participating in a critique of the weekly student presentations; Mike also explained that studying for the final exam was intended as a synthesizing experience for students. Diana described her Humanities "reading quizzes"

> "as another opportunity for [students] to let me know they are doing the work of the course." She explained that "... if they aren't doing the reading, they're not going to get very much out of the class, and the class discussion isn't going to be worth much. So knowing that I may give them a reading quiz any time, is just going to be that nice little goad that will keep them prepared." Diana encouraged her students to pull together the material for the entire course by giving students a comprehensive final exam and offering to double the worth of the final if doing so would help their average.

Introductory engineering homework assignments were designed to force students to keep up with the reading and provide opportunities to practice skills learned in class, and the most important synthesizing task was the major design project, which required students to apply skills and use tools that engineers use to solve complex problems which have many variables and many potential solutions. In the History graduate seminar course the teachers helped students keep up with the work of the course by requesting that students complete alternate weekly assignments. One group of students responded to the readings by writing short analytical thought papers, providing copies for the entire class in time for review prior to class, while the other group wrote questions to prompt class discussion. Kathryn explained, "What it makes them do is not only do the reading but to come in having really thought about it to a greater degree than they might have otherwise." At the end of the semester, students wrote an essay requiring integration of the course content.

Assignments in the nursing education course were hierarchical, so that the first provided the foundation for the second, the second contributed to the third, and so on, so that by the end of the semester the students had written an integrated teaching unit and presented a final micro-teaching session that combined all of the previous assignments. Valerie's wildlife biology weekly assignments required students to integrate information gained from their reading, data gathered from lab experiences, and their knowledge of scientific writing and reporting.

These examples illustrate Doyle's notion of knowledge transformation: they required inferential thinking, problem-solving skills, use of multiple sources of information, and some form of a planned written presentation as demonstration of completing academic work (Doyle, 1986b). These experienced teachers guaranteed that knowledge transformation would occur by designing tasks requiring students' engagement with and synthesis of the course content.

Learning through Doing

This theme emerged through all teachers' data as an implicit instructional theory. For example, Mike's goal for students to become experts at some management tool was accomplished by requiring thorough study and explication of one tool. Learning through doing influenced how the engineering faculty committee planned the introductory course assignments:

> Most of us are convinced that the way you learn how to use a computer, PC in particular, is -- the way the students have to learn is the same way we did. You can put view graphs up on the wall with proper keystrokes; you can tell them in a theoretical way what a program is supposed to do; but the reality is that the way you really learn to process words or to use a spread sheet is to sit down in front of the PC and play with it.

Valerie's goal in the wildlife class was to provide conceptual learning so that her students would become intelligent (nonscientist) citizens appreciative of the complexities in such popular causes

as wildlife preservation. She believed the best way to arrange for students to understand and retain these concepts was to design tasks in which students performed or simulated field work, such as analyzing animal feeding behavior or conducting an animal census. And in both sophomore humanities and graduate history, the teachers expressed the belief that engaging students in discussions of the materials was a good way to help them understand the content. Kathryn elaborated on the value of discussion:

> A lot of your best insights come from that kind of informal exchange.... good academic work really is interactive. Part of what we do is, we read other people and we absorb and synthesize various kinds of works available as the written word, but you can really move a lot further in a discussion format.

Mirroring Thought and Action

Others studying faculty members' sense of their own discipline have investigated how that disciplinary sense influences teaching (e.g. Donald, 1987). In this study, the participant teachers designed academic tasks to mirror the field by teaching students how those in the field would be expected to think and work. For example, most expected their students to demonstrate problem solving. The engineering students were given authentic problems and asked to find solutions that addressed the various constraints accompanying the situation; the professor, anticipating many of the likely answers, wanted his students to understand how this happens in professional practice. Mike's students were shown that choosing and solving problems with a particular management tool depended upon the goals and context of its use. Andrea represented nursing education as technical; students learned skills and strategies and applyied them by (for example) writing performance objectives, using reinforcement, and constructing test items.

For both Mike and Matthew problem solving included ethical considerations; for example, Matthew used the Challenger accident as a springboard for discussion of ethics in engineering.

Another form of problem solving drew from the context of students' lives.
As she discussed how in Humanities students study literature and art in its historical context and relate those values to their own lives, Diana commented,

> Because I think ... If the material can't function within your experience, whether it's career or personal life experience outside of the university, then obviously there's a real question about whether you learned anything, or whether you were extended anything that was worth learning, or something. It ought to -- I don't mean "be practical" in the sense of help you earn a living, but it ought to be something that you can sort of make your own.

Relevancy to students' lives entered other courses as well. In the history seminar on race and gender, the teachers wanted students to gain a sense of empowerment in areas of their lives affected by race and gender issues, and in wildlife biology Valerie wanted her students to become informed citizens. Mike said that one of his goals was to help students become more marketable, and another was to assist students in their search for dissertation topics.

A few teachers modeled the way academics in their disciplines work and think. Kathryn noted,

> I guess I think about the assignments as much in terms of skill development as I do in terms of content -- that the writing, in particular, was to enable students [bound for professional careers in academia] to summarize, critique, synthesize, and theorize.... And the discussions were because for academia ... they need to develop those skills."

Consistency

Consistency of intentions and task design follows from the three themes explicated above. The two educational purposes these teachers gave the highest priority were

> (1) developing their cognitive processes, helping students learn how to learn, and providing opportunities to use and strengthen intellectual faculties; and
>
> (2) providing students with opportunities and resources so that growth can occur in students through their own choices in the areas relevant to them.

All the participants appeared to provide students with learning experiences requiring interpretive, synthesizing, and evaluative skills -- expected to strengthen intellectual development. Many of these experiences provided opportunities for growth in areas personally important to students, whether in solving personal problems, developing competencies pertinent to their future employment, or becoming informed decision makers.

The Role of Academic Tasks in Fostering Student Learning

In his landmark overview of educational philosophy, Fenstermacher (1986) introduced the concept of "studenting." This concept so artfully expresses the synthesized findings of this study that we digress to raise it here.

> It certainly seems odd to use the word 'student' as an intransitive verb. The strangeness is probably due to the fact that we make the term 'learning' do double duty, sometimes using it to refer to what the student actually acquires from instruction (achievement), and other times using it to refer to the processes the student uses to acquire content (task). Because the term 'learning' functions in both a task and achievement sense, it is easy to mix the two and thus contend that the task of teaching is to produce the achievement of learning, when it in fact makes more sense to contend that a central task of teaching is to enable the student to perform the tasks of learning (Fenstermacher, 1986, p. 39).

The chief finding of this research on college academic tasks is that their chief function is to foster "studenting." Students do not learn the courses' subject matter by direct transmission; "the teacher does not convey or impart the content to the students" (p. 39). Rather, the teacher designs academic tasks to bring students into contact with -- and help them synthesize -- the subject matter. Fenstermacher continues,

> Rather, the teacher instructs the student on how to acquire the content from the teacher, text, or other source. As the student becomes skilled at acquiring content, he or she learns (p. 39).

Our finding has been that teachers' instruction in college course "studenting" occurs through the tasks they design -- tasks to bring about engagement and synthesis, tasks to promote learning through their accomplishment, tasks to mirror the field's expected thought and action -- and in sum, tasks that are consistent with teachers' curricular purposes and pedagogical intentions. Our teachers attached such importance to these tasks that their accountability systems incorporated both the tasks themselves and the subject matter the tasks represented. They expected students to perform the tasks of studenting as a vehicle to performing the evidence of learning.

What, then, do our findings imply for the tasks of college teaching? Fenstermacher continues:

> The teacher's tasks include instructing the learner on the procedures and demands of the studenting role, selecting the material to be learned, adapting that material so that it is appropriate to the level of the learner, constructing the most appropriate set of opportunities for the learner to gain access to the content ... monitoring and appraising the student's progress, and serving the learner as one of the primary sources of knowledge and skill (pp. 39-40).

The key responsibility in this endeavor is design of effective academic tasks. Particularly because learning in college and university settings occurs away from teachers' direct oversight, college teachers' design of these tasks takes on particular importance. Uncovering the nature of effective academic tasks and the way effective teachers use them at all levels of college teaching has been the purpose of this research.

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